

**Marine Vital Signs Monitoring in the Tijuana – San Quintín Coastal Corridor:
Laying the Roadmap for a Cooperative Public – Private Conservation Partnership**

*Signos vitals de la salud en los ecosistemas marinos de Baja California norte:
taller para el desarrollo cooperativo de sistemas de monitoreo*

**March 30-31, 2006
Grand Hotel Tijuana
Tijuana, B.C., Mexico**

WORKSHOP REPORT



Prepared by:

Kirsten Gilardi¹, Ernesto Franco², Vinicio Macias³, and Pamela Yochem⁴

¹ SeaDoc Society, UC Davis Wildlife Health Center (kvgilardi@ucdavis.edu)

² Ernesto Franco Vizcaíno, CICESE (franco@cicese.mx)

³ Vinicio Macias, UABC (vmacias@uabc.mx)

⁴ Pamela Yochem, Hubbs – SeaWorld Research Institute (pyochem@hsrwi.org)

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I. INTRODUCTION

The Baja California Pacific near shore marine ecosystem lies at the land-sea interface, between the Tijuana River to the north (32.54° N) and San Quintín to the south (30.24°N). This ribbon of sea, from the intertidal zone out to the depth to which sunlight penetrates to the seafloor (approximately 50 m depths), absorbs and responds to inputs and impacts from the uplands and coastal ocean of the Tijuana - San Quintín corridor. This region of Baja California has experienced accelerated population growth and industrial development since the 1950s, especially between Tijuana and Ensenada.

In Spring 2003, K. Gilardi (SeaDoc Society) and E. Franco (CICESE) began informal discussions on the potential for a marine ecosystem health program that could support and facilitate the acquisition and dissemination of highly applied, targeted science that would increase understanding of the coastal marine ecosystem of Baja California and inform stewardship of it as it undergoes rapid urbanization. Gilardi described the formation, structure and successes of the SeaDoc Society, a marine ecosystem health program of the UC Davis Wildlife Health Center (www.seadocsociety.org), which facilitates marine ecosystem health science in the Puget Sound and Georgia Basin transboundary marine region of Washington state (USA) and British Columbia (Canada) through a competitive grants program and a full time community scientist. Gilardi shared the SeaDoc Society's vision that ultimately, this model could be applied to other coastal regions under pressure.

Franco invited several colleagues at CICESE, UABC and other organizations to be a part of these early informal meetings, and there was a general consensus that: 1) with few exceptions, Mexican marine scientists lack adequate resources to conduct the quantity and quality of marine ecosystem health-oriented research that they want to and that is needed; and 2) the necessity for a coordinated assessment and research effort is paramount in the face of rapid development of the coastline, so that stewards can use solid information upon which to build community and inform decision makers. By Summer 2004, an organizing team, comprised of Gilardi, Franco, Vinicio Macias (UABC) and Pamela Yochem (Hubbs – SeaWorld Research Institute), had formed around the shared goal of developing and implementing an applied marine science initiative for the transboundary region from San Diego to San Quintín. The addition of the expertise and interests of UABC and HSWRI significantly expanded the capacity and potential of the team to mount a truly transboundary program.

The organizing team decided that in order to advance an applied marine science initiative as quickly and efficiently as possible, it made sense to build upon an existing framework for environmental assessment and monitoring. In order to achieve a transboundary perspective right from the start, the decision was made to work towards developing a Vital Signs Monitoring Program for the Tijuana - San Quintín region. "Vital Signs" are selected biological, chemical and physical factors and processes of the marine ecosystem that indicate the overall health and condition of the region, known or hypothesized effects of stressors, or elements that have important human values. Vital Signs monitoring programs have been successfully applied in many parts of the world to help resource managers detect human-induced change and natural change in marine ecosystems, and are being applied in both Channel Islands National Park as well as in Cabrillo National Monument, two marine protected areas located just north of the international border, in the Southern California

Bight. The organizing team felt that implementation of a Vital Signs program for the Baja California Pacific near shore marine region would help identify critical gaps in our understanding and knowledge of the ecosystem, and would facilitate a coordinated and cooperative marine ecosystem health research effort involving the public and private sectors on both sides of the border.

In Spring 2005, the Marisla Foundation awarded the SeaDoc Society a modest planning grant to initiate this process on the Baja California side of the international border. Funds were provided for conducting a bibliographic study of the current state of knowledge on the distribution and abundance of living marine resources of the near shore marine ecosystem of Baja California (*Preliminary Study on the State of Environmental Conditions for the Coastal Zone Tijuana - San Quintín Baja California, México*, prepared by Luz Veronica Rodriguez Villanueva, PhD, Ensenada, B.C. and San Diego, CA). The Marisla Foundation grant also provided support for the convening of an initial stakeholder workshop. This report describes the activities and outcomes of this workshop, which was held on March 30-31, 2006 in Tijuana, Baja California, Mexico.

II. VITAL SIGNS WORKSHOP SUMMARY

A. Participants

Approximately 120 individuals were invited to participate in the workshop. Registration was capped at 50 individuals, and the following 48 individuals participated:

<u>Name</u>	<u>Affiliation</u>
Alfonso Aguirre	Conservacion de Islas
Saúl Álvarez Borrego	CICESE
Silvia Avilés	Ecología del Estado de Baja California
Bonnie Becker	Cabrillo National Monument
Mary Bergen	California Department of Fish and Game
David Bunn	UC Davis Wildlife Health Center
Jeff Crooks	Tijuana River National Estuarine Research Reserve
Gary Davis	SeaDoc Society, and Channel Islands National Park
Eugenio Carpizo Ituarte	UABC
Horacio de la Cueva	CICESE
María Gonzáles Esparza	UABC
Victoria Díaz	CICESE
Leslie Dierauf	SeaDoc Society, and USGS Nat'l Wildlife Health Center
Ernesto Franco Vizcaíno	CICESE
Juan Manuel Garcia	Terra Peninsular
Joseph Gaydos	SeaDoc Society, UC Davis Wildlife Health Center
Kirsten Gilardi	SeaDoc Society, UC Davis Wildlife Health Center
Carlos Godínez Reyes	CONANP
Isabel Granillo	Nature Conservancy
Alan Harper	Terra Peninsular
Gisela Heckel	CICESE
Don Hunsaker	Hubbs - SeaWorld Research Institute

<u>Name</u>	<u>Affiliation (cont)</u>
Rebeca Kobelkowsky	CONANP
Lydia Ladah	CICESE
Vinicio Macías Zamora	UABC
Ricardo Martínez Lara	City of San Diego
Laura Martínez Rios	Pro Esteros
Jonna Mazet	UC Davis Wildlife Health Center
Mike McCoy	Tijuana River National Estuarine Research Reserve
Anne McEnany	International Community Foundation
Adán Mejía Trejo	UABC
Victoria Minnich	UC Los Angeles
Kevin Ranker	SeaDoc Society, and San Juan County Commission
Win Rhodes	Corona del Mar, CA
Oscar Rivera	Secretaria de Pesca, Comision para el Desarrollo Rural
Veronica Rodriguez	UABC
Lorenzo Rojas Bracho	Instituto Nacional de Ecología
Jorge Rosales Casán	CICESE
Clayton Phillip	Tijuana River National Estuarine Research Reserve
Oscar Romo	Tijuana River National Estuarine Research Reserve
Mike Shane	Hubbs - SeaWorld Research Institute
Oscar Sosa Nishizaki	CICESE
Drew Talley	San Francisco Bay National Estuarine Research Reserve
Gretel Torres de la Riva	UC Davis Wildlife Health Center
Steve Weisberg	Southern California Coastal Water Research Project
John Wigmore	Leucadia, CA
Sherry Williams	State of California Employment Development Department
Pamela Yochem	Hubbs - SeaWorld Research Institute

B. Workshop Organizers/Staffing and Venue

Gary Davis, Veronica Rodriguez and Ricardo Martinez provided critical assistance in organizing and staffing the workshop. David Bunn, Leslie Dierauf, Joe Gaydos, Jonna Mazet, and Gretel Torres de la Riva served as recorders for the break-out groups.

The workshop was held at the Grand Hotel Tijuana, a location chosen because of its relatively easy access for both Mexican and American participants.

C. Workshop Schedule:

The 2-day workshop was organized as follows:

Thursday March 30

11:00: Welcome

11:30: Introductions

13:00: Lunch

14:30: Keynote Address
15:00: Vital Signs Monitoring
15:30: Break-out Session I - Monitoring Goals
18:00: Reception
19:00: Dinner

Friday March 31

0700: Breakfast
0800: Welcome back
0815: Break-out Session II - Ecosystem Model
10:15: Coffee break
10:30: Break-out Session III - Vital Signs
12:30: Closing remarks
13:00: Adjourn

D. Workshop materials

Upon arrival, all workshop participants received a packet of materials containing:

1. Workshop Agenda
2. List of Registrants
3. Working Group Assignments
4. Workshop “Basics”
 - What are Vital Signs?
 - Key Questions
 - Workshop Objectives
 - What is our Vision
5. Vital Signs Monitoring background materials
 1. Overview of U.S. National Park Service’s Vital Signs Monitoring Program
 2. Gary E. Davis. 2005. “National Park stewardship and ‘vital signs’ monitoring: a case study from Channel Islands National Park, California.” *Aquatic Conservation: Marine and Freshwater Ecosystems* 15: 71-89.
6. Break-out Session Materials
 - i. Break-out Session Objectives
 - ii. Explanatory materials
 - “Goals” pyramid
 - Draft conceptual model
 - Model diagram samples
 - West Coast Vital Signs
 - iii. Sample worksheets
 - iv. Draft Conceptual Ecosystem Model (version 03/13/06)

E. Workshop Program

The workshop commenced on March 30, 2006 at 11:00 with a welcome and introduction by Gilardi, who provided a brief background on the planning effort. Gilardi then introduced Vinicio Macias,

who gave a Powerpoint™ presentation on “Our Coast,” describing the exceptional biodiversity of the Baja California Pacific coastal region and the socioeconomic and cultural services it provides, and sharing his concern for the pressures on the coastal ocean that are resulting in visible and rapid change. Macias’ presentation served to make the case for support of a marine monitoring program.

Gilardi then shared the vision and strategy for a coordinated marine ecosystem health initiative:

Vision:

Stewards of the marine environment along the Pacific coast of Baja California between Tijuana and San Quintín will use Vital Signs to inform their actions, evaluate their programs’ successes, and attempt to improve vital signs conditions as an outcome of their actions.

Strategy:

To create an organizing framework for **existing and new** monitoring programs and projects that allows for synergy, collaboration, and comparability across time and place, and a measure of the overall health of the ecosystem.

Gilardi clarified the workshop objectives:

- To obtain peer review and input on a draft conceptual ecosystem model of the Tijuana - San Quintín coastal marine ecosystem.
- To set goals for a Vital Signs monitoring program.
- To develop appropriate Vital Sign indicators for assessing the health of the ecosystem.

Workshop participants then each took 2-3 minutes to introduce themselves and describe their professional and personal interests in marine ecosystem health.

After lunch, Saul Alvarez Borrego, oceanographer and former Director General of CICESE, delivered a keynote address, describing the natural variability in the coastal ocean off Baja California, and making a case for the importance of long-term monitoring for both understanding the ocean ecosystem and for detecting change that is anthropogenic in origin.

Gary Davis, Channel Islands National Park, then gave an overview presentation on Vital Signs Monitoring: how these programs are developed, structured, and implemented, and how they have been used to enable the National Park Service to understand the ecosystems they manage, detect change when its occurring, and implement solutions for ecosystem health problems as they arise. He provided examples of how Vital Signs monitoring has allowed Channel Islands National Park detect precipitous declines in native abalone populations, and determine causes of decline in endemic Channel Island fox populations.

The remainder of the workshop (Thursday afternoon through Friday at noon) was spent in three break-out sessions during which participants assembled into five different groups and collectively discussed and identified the following:

- Session I: Monitoring Goals
 - What should our monitoring goals be?
 - Why are these monitoring goals important?

- Session II: Conceptual Ecosystem Model
 - How do we see this place?
 - - How should we use our conceptual model to organize a monitoring program? - Vital Signs
- Session III: Vital Signs
 - What are appropriate Vital Signs?
 - What is already being monitored? How? By whom?

Objectives for each break-out session were reiterated at the start, and then groups spent approximately 1.25 hours in discussion, followed by 45 minutes of report-outs from each of the groups on the results of their discussions (results described in next section of report).

F. Workshop Products

1. Identification of monitoring goals

Workshop participants identified the following monitoring goals for the Baja California Pacific coast from Tijuana to San Quintín. Vital Sign indicators should be selected so as to maximize the information gained from monitoring them, so that the information can be used to achieve the following goals.

- Determine status and trends of ecosystem health, services, practices and values.
- Detect change in the ecosystem that can be attributed to anthropogenic vs. natural variation.
- Ensure public health and safety.
- Implement community development and outreach strategies that will lead to successful marine stewardship.
- Obtain information that allows for timely decisions for management and the potential for preemptive action.
- Sustainably manage fisheries (especially the urchin fishery).
- Inform resource users.
- Support education programs.
- Engage the public.
- Assess impacts of anthropogenic activities.
- Institutionalize monitoring to allow for regular communication and collaboration over the long term.
- Determine how stressed the ecosystem is, and to know whether is it under utilized, well utilized, or over utilized.
- Bring scientists together, using common protocols, language, and methods.
- Identify ecosystem stressors, including land-based stressors, to allow for early amelioration before impact is great.
- Help scientists be advisers and help the public be a part of the process.
- Understand where the greatest changes are happening, and where habitats are limited, so that we can choose where to focus restoration and conservation.
- Assess effectiveness of management actions.

- Enable prediction of extreme events/scenarios to allow for implementation of management actions ahead of time.
- Inform decisions about freshwater resource management.
- Enable compliance assessment.
- Provide “political cover”: provide data on which policymakers can back up their decisions.

Workshop participants also identified the following important aspects of a monitoring program:

Scale monitoring to local, regional, and/or landscape levels; be explicit about locality.

Consider/aim north and south of our “artificial” boundaries of the ecosystem as described: the ecosystem extends from Santa Barbara, CA to El Rosario, BC.

Take a comparative approach to monitoring.

Having a baseline of information is critical: will allow us to assess how much things have changed up to this point..

Make sure indicators are testable; make sure the monitoring program is iterative.

Strive for making the monitoring program as efficient as possible so that it will be supported by the community.

Know who is doing what to avoid duplication and prioritize effort.

Permanency allows for long-term involvement.

2. Improvement of the Draft Conceptual Ecosystem Model

There was a general consensus that while “all models are wrong, and some of them are useful,” that it was important for the model to be fleshed out with the following information, details and perspectives.

Focus on species that truly inhabit the near shore ecosystem; e.g. some of the marine mammals listed don’t actually inhabit the near shore ecosystem.

Describe the historical ecology of the region.

Add maps of the region, and that show elements and stressors.

Differentiate between natural and anthropogenic stressors

Consider reorganizing the model: are exhaustive species lists needed, or would representative lists (based on abundance, widespread, vulnerability) suffice? Should the model be organized around habitats, discussed hierarchically?

Information on the following is lacking, and should be added wherever it is available:

Fisheries information

Socioeconomic elements

Human health and livelihoods

Priority habitats and sites

Policy/enforcement components

Sources of chemical pollution, sewage, agricultural runoff, in the water and in the air

Viewpoints of tourism, agriculture, urban planners, public health practitioners

Speculation on, or knowledge of, long-term trends.

Global climate change impacts.

Future potential stressors/impacts: future outlook for region.

Workshop participants identified the following aspects of the draft conceptual model for which we lack adequate understanding of the composition, structure, or function of some of these ecosystem elements. Many of these related to our understanding of the connectivity between elements:

What are the connections between land and sea; between people and the sea?

What are the connections between socioeconomic factors and habitats?

What is the size of the terrestrial buffer between land and sea?

What are small-scale oceanographic characteristics of the system?

Where are the priority habitats and sites?

What are the influences of stressors on these elements?

What are the impacts of harvest?

What is the significance of stressors? We can point to them, but can't describe impacts.

What are the impacts of shipping traffic and noise?

What are the sociopolitical and socioeconomic influences on the coastal ocean?

What is the legal framework for ocean stewardship and legal enforcement?

How do we improve access to available information?

We lack coordination across agencies and regions, lack surveillance data.

3. Suggested Vital Signs Indicators

In break-out session III, participants self-assembled into 4 groups organized around the following ecosystem elements: human use, biota, water, and landscape/seascape. Each group was tasked with further breaking these ecosystem elements into specific components, and then brainstorming on appropriate vital signs for those components. In some cases, groups described why these vital signs were chosen. Additionally, groups were asked to identify who, if anyone, was either already conducting monitoring of these vital signs, or who might be best situated to collect this type of data.

Element	Components	Vital Signs	<i>Why?and Who?</i>
Human Use	Fisheries/Aquaculture	<ul style="list-style-type: none"> - Harvest of key species - Overall catch composition over time - Biodiversity - Fishermen's behavior 	Who: Nat'l Institute of Fisheries; cooperatives; PROFEPA

	Tourism	<ul style="list-style-type: none"> - Use of beaches and coastline for recreation (quality, quantity) - # of days visitors at coastal sites - what are the frequently-visited sites 	Who: Secretary of Tourism, Al Costa; whale watching industry reports to SEMARNAT
	Industry	<ul style="list-style-type: none"> - Current industries - Municipal development plans - Future industries - Permit issues - Railroads, transport - Employers, companies - Power/fuel/water demands of industry 	Who: Chambers of commerce, COLEF
	Coastal Development	<ul style="list-style-type: none"> - Ejido ownership changes - Agricultural and urban development and expansion 	Who: NGOs for some areas, e.g. Pro Natura, TNC; UABC
Biota	Sandy/benthic	<ul style="list-style-type: none"> - Polychaetes - Sand dollars - Least terns - Halibut 	Why: Sedentary species bio-accumulate and are easy to collect data on; practical, depend on plankton; dependent on sandy beaches; commercially important Who: CICESE, UABC
	Pelagic	Sharks Coastal bottlenose Sardine/anchovy/ Squid (?) landings Strandings	Why: mid to high trophic levels integrators, indicate productivity of system interactions with fisheries Who: CICESE, UABC
	Islands	Breeding birds(e.g. murrelets) Pinnipeds Softbottom polychaetes	Who: Islas Conservacion, CICESE, UABC

	Kelp forest, rocky subtidal	Demography of keystone species, Canopy cover Fish diversity	Why: Integral, important primary producer Who: CICESE, UABC
	Rocky intertidal	Intertidal kelps, starfish, mussels, seagrasses, rare species (e.g. black abalone)	Who: PISCO, CICESE, UABC
	Estuaries/lagoons	Sea grasses, geographic extent of estuaries, birds (e.g. clapper rails), rays and skates, Parasites	Who: UCSB, CICESE, UABC, SIO, NOAA
	Water column	Zoo and phytoplankton, HABs, Physicochemical characteristics	Who: CICESE, UABC
Water	Biologic inputs	Bacteria	Why: Human health effects Who: Health Dept, Water Company, JAJAN
	Biochemical inputs	Nutrients	Why: Over- enrichment, impact on animals, food chains, resources
	Toxic inputs	Toxics	Why: Measuring input, important because of accumulation in organisms Who: UABC
	Freshwater inputs	Volume	Why: Impacts salinity, scouring Who: rain gauges
Landscape/ Seascape	Hydrography	-Water quality -Transport of biotics and abiotics	Why: Predictive ability/assessment Who: Tidal gauges, CICESE, UNAM
	Habitat	-Habitat distribution -Habitat change	Why: are a proxy for species distribution info, elucidate anthropogenic vs natural causes of these changes Identify critical habitat Who: Marshes and kelp forests:

			CICESE, Pro Esteros, Pro Natura; Kelp forest: aerial surveys; Rocky intertidal: PISCO
	Coastline geomorphology	-Erosion/accretion - Development regulations and restrictions	Why: identifies critical habitat Who: CICESE, UABC, local governments
	Land use change	-Pollutants - Sedimentation - Modification of shoreline	Who: TNC, CICESE, Terra Peninsular, IMIP, Pro Esteros
	Transport	- Energy - Organismal - Contaminant	Why: Helps understanding of food webs and gene flow, aids fisheries management; livelihoods and human health are dependent on transport processes, elucidates connectivity Who: CICESE, UABC, SIO

4. Next Steps

Gary Davis suggested the following important next steps:

- Continue to communicate with one another about the ideas discussed in this workshop
- Identify individuals who can and want to “champion” a Vital Signs monitoring effort in the region
- Be sure to include people and groups in future discussions who are missing from this first meeting
- Collectively agree on what the actions, products and communications should be
- Always demonstrate connections to people
- Identify who is doing what: with what resources, to address what needs

Workshop participants offered the following suggestions on how to take these next steps:

- Communicate with colleagues not present about the workshop and plans for moving forward
- Use the project website as a central clearinghouse of information: reports, links, etc. This will enable sharing of information and education of other entities.

Immediate Actions:

By **April 30:** Gilardi to distribute workshop report

By **May 15**: Workshop participants to provide new and additional information for revising the draft conceptual ecosystem model. Information should be sent electronically to Gilardi (kvgilardi@ucdavis.edu).

By **June 1**: Gilardi to distribute 2nd draft of Conceptual Ecosystem Model

On-going: Identify individuals interested in pursuing further planning and implementation.